




Introduction to CAD

Course Scope and Sequence Proposal

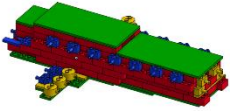
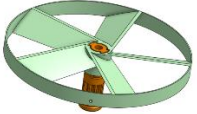
An Introduction to CAD class is a course that teaches students the basics of computer-aided design, a process of creating and modifying digital models of physical objects. CAD is widely used in engineering, architecture, manufacturing, and other fields that require precise and realistic representations of products, structures, or systems. In this class, students will learn how to use CAD software to create and edit 2D and 3D models, apply different materials and textures, perform simulations and analyses, and export their designs for printing or fabrication. The class will also cover the principles of design, geometry, and drafting, as well as the ethical and social implications of CAD. By the end of the course, students will be able to use CAD as a tool for creative problem-solving and innovation.

Unit	Lessons	Topics
Unit 1 Welcome to CAD (approx. 4-5 hours, extended version approx. 8-10 hours)	1.1 - Jumping in	<ul style="list-style-type: none"> Intro to the user interface Navigating documents Pan, zoom, rotate Scavenger hunt
	1.2 - Why CAD?	<ul style="list-style-type: none"> Purpose of CAD Views Measurements Part Studio vs Assembly
	1.3 - Creating 3D Models	<ul style="list-style-type: none"> Make 3D Parts What is a feature? Orthographic Views
	1.4 - Modifying Your Models	<ul style="list-style-type: none"> Solve design problems Edit existing parts Feature list Drawings
	Resources	<ul style="list-style-type: none"> Unit Summary and Pacing Guide Lecture - A Brief History of CAD Unit 1 Formative Assessment
Unit 2 Designing a Skateboard	2.1 - Designing the Deck	<ul style="list-style-type: none"> Design intent Sketching Dimensions Constraints




<p>(approx. 8-9 hours, extended version approx. 16-30 hours)</p> 		<ul style="list-style-type: none"> ● Extrude, fillet ● Hole feature
	2.2 - Designing the Trucks	<ul style="list-style-type: none"> ● Multi-part Part Studios ● Symmetry ● Use and Offset tools
	2.3 - Wheels and Bearings	<ul style="list-style-type: none"> ● Revolve ● Construction lines ● Diameter dimensions
	2.4 - Putting It All Together	<ul style="list-style-type: none"> ● Assembly ● Standard content ● Mate connectors ● Degrees of freedom
	2.5 - Now Shred!	<ul style="list-style-type: none"> ● Modify the board dimensions (does your design intent stay intact?) ● Change the shape of the board and/or wheels ● Curve the nose and tail of the board ● Make the trucks more realistic ● Add text, spokes, treads, or pattern to the wheels ● Make real bearings ● Add a logo or design ● Design a skate park
	2.6 - Simulation	<ul style="list-style-type: none"> ● Analysis types ● Loads & Constraints ● Setup and Execution
	Topics Revisited	<ul style="list-style-type: none"> ● Navigating documents ● Part and assembly viewing
	Resources	<ul style="list-style-type: none"> ● Unit Summary and Pacing Guide ● Lecture - Why CAD? ● Unit 2 Formative Assessment
<p>Unit 3 CAD Power Tools</p> <p>(approx. 5-6 hours, extended)</p>	3.1 - Make a Brick (Review)	<ul style="list-style-type: none"> ● Configurations ● Patterns ● Design intent
	3.2 - One Brick to Rule Them All	<ul style="list-style-type: none"> ● Configurations (rows, columns, thick/thin, color) ● Variables



<p>version approx. 10-15 hours)</p> 	3.3 - How the Pros Do It	<ul style="list-style-type: none"> • Versions and history • Branching
	3.4 - Building Blocks	<ul style="list-style-type: none"> • Assemble multiple configurations • Make your own configurable part
	Topics Revisited	<ul style="list-style-type: none"> • Design intent • Sketching • Construction lines • Extrude
	Resources	<ul style="list-style-type: none"> • Unit Summary and Pacing Guide • Lecture - What is an Engineer? • Unit 3 Formative Assessment
<p>Unit 4 Teamwork Makes the Dream Work <u>CAD</u> (approx. 5-8 hours, extended version approx. 15-20 hours)</p> 	4.1 - Ring and Spinner	<ul style="list-style-type: none"> • 2-person collaborative project • Helix and Sweep • Collaboration tools • In-context modeling
	4.2 - Key and Prop	<ul style="list-style-type: none"> • Collaboration tools • In-context modeling • Meshing gear teeth
	4.3 - Assembling the Launcher	<ul style="list-style-type: none"> • Slider mate • Rack and Pinion relation • Animating mates
	4.4 - Branch and Merge	<ul style="list-style-type: none"> • Creating versions • Design modifications with branches • Merging branches • Collaborating with comments • Design review
	4.5 - Let's Fly! <i>(optional)</i>	<ul style="list-style-type: none"> • 3D printing basics • How 3D printers work • Exporting STLs • 3D printing tips and troubleshooting
	Topics Revisited	<ul style="list-style-type: none"> • Versions and branching • Part Studios • Mate connectors • Standard content • Revolve
	Resources	<ul style="list-style-type: none"> • Unit Summary and Pacing Guide • Lecture - Designing in Teams



		<ul style="list-style-type: none"> ● Unit 4 Formative Assessment
	Topics Revisited	<ul style="list-style-type: none"> ● Versions and branching ● Collaboration ● Standard content
	Resources	<ul style="list-style-type: none"> ● Unit Summary and Pacing Guide ● Course Summative Project
<p><u>Unit 5</u> Putting CAD to Work (approx 13-18 hours, extended version approx. 30-40 hours)</p> 	5.1 - Sharpening Your Tools	<ul style="list-style-type: none"> ● Engineering design process ● Reverse engineering
	5.2 - Design Time	<ul style="list-style-type: none"> ● Importing content ● New modeling tools
	5.3 - Build, Test, Improve, Repeat	<ul style="list-style-type: none"> ● Versions for documentation ● The revision process
	5.4 - Show the World!	<ul style="list-style-type: none"> ● Project rubric ● Have a 3D printer? Turn your design into reality!
	Topics Revisited	<ul style="list-style-type: none"> ● Versions and branching ● Collaboration ● Standard content
	Resources	<ul style="list-style-type: none"> ● Unit Summary and Pacing Guide ● Course Summative Project